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THE PLANT DISEASE REPORTER

Issued By

THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey
BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING
AGRICULTURAL RESEARCH ADMINISTRATION
UNITED STATES DEPARTMENT OF AGRICULTURE

Volume 34 Number 2

February 15, 1950

The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station — Beltsville, Maryland
Volume 34 — February 15, 1950 — Number 2

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REPORT OF THE SPECIAL COMMITTEE OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY ON NOMENCLATURE AND CLASSIFICATION OF PLANT VIRUSES

The Council recommended and the Society accepted the following report of the Special Committee on Nomenclature and Classification of Plant Viruses:

In October 1949, the committee conducted a survey by secret ballot among American plant virologists to ascertain their preference in regard to the different systems of plant virus nomenclature that have been proposed. Ballots were sent to 190 individuals and 128 replied. In response to the general question of preference between binomial and numbering systems 84 voted for binomial, 41 for numbering and 3 did not vote. The vote on individual systems was tallied as follows:

Numbering Systems	J. Johnson	24
	K. M. Smith	17
Binomial Systems	H. S. Fawcett	4
	F. O. Holmes	66
	H. H. McKinney	6
	H. H. Thornberry	1
	W. D. Valleau	4
Others		6

About 2 American plant virologists favored a binomial system to every 1 favoring a numbering system. A majority of those voting preferred Holmes' system.

However, a substantial minority chose numbering systems and in view of this the Committee recommends that at the International Botanical Congress to be held in July 1950 no rigid action regarding nomenclature systems for plant viruses be taken. The committee does not favor endorsement by the International Botanical Congress of any particular system at the present time, preferring instead that the period of experiment and free choice be left open.

It is requested that the results of the survey and the conclusions of the committee be presented at the International Botanical Congress by the American representatives on its International Virus Committee.

L. M. Black, Chm.; C. W. Bennett, James Johnson, H. H. McKinney, Frank McWhorter, W. C. Price, Freeman Weiss.

A BIBLIOGRAPHY ON PLANT VIRUS NOMENCLATURE

(This Bibliography does not constitute a part of the report of the Special Committee of the American Phytopathological Society on Nomenclature and Classification of Plant Viruses, given above. It was prepared to aid plant virologists in voting on their preference as to nomenclature systems. The Reporter prints it here because of its general usefulness to plant pathologists.)

1. Bawden, F. C. Chron. Bot. 6: 385-386. 1941.
2. Bawden, F. C. The classification of viruses. In "Plant viruses and virus diseases" Chronica Botanica Co., Waltham, Mass. pp. 248-257. 1943.
3. Bennett, C. W. The nomenclature of plant viruses. Phytopath. 29: 422-430. 1939.
4. Fawcett, H. S. Suggestions on plant virus nomenclature as exemplified by names for citrus viruses. Science 92: 559-561. 1940.
5. _____. Virus nomenclature. Chronica Botanica 7: 7-8. 1942.
6. Holmes, F. O. Proposal for extension of the binomial system of nomenclature to include viruses. Phytopath. 29: 431-436. 1939.
7. _____. Order Virales. The Filterable Viruses. Supplement No. 2, Bergey's Manual of Determinative Bacteriology, Edition VI. 1127-1286 + I. - XXIII. 1948.
8. Johnson, J. The classification of plant viruses. Wisconsin Agr. Exp. Sta. Res. Bull. 76: 1-16. 1927.

9. Johnson, J. The nomenclature of plant viruses. Sixth International Botanical Congress. Proceedings 2: 193-195. 1935.
10. _____. Virus nomenclature and committees. Chron. Bot. 7: 65-66. 1942.
11. _____. Systems of virus classification and nomenclature. Tijdschrift over plantenziekten 55: 128-137. 1949.
12. Johnson, J. and Hoggan, I. A. The challenge of plant virus differentiation and classification. Science (n. s.) 73: 29-32. 1931.
13. _____ and _____. A descriptive key for plant viruses. Phytopath. 25: 328-343. 1935.
14. Limasset, P. Nomenclature des virus phytopathogènes. Annales des Épiphyties 12: (n. s.) 317-323. 1946.
15. _____. La Systématique Des Virus Phytopathogènes. Annales Des Épiphyties. 14 (n. s.) 283-295. 1948.
16. McKinney, H. H. Genera of the plant viruses. Jour. Wash. Acad. Sciences 34: 139-154. 1944.
17. _____. Descriptions and revisions of several species of viruses in the genera Marmor, Fractilinea and Galla. Jour. Wash. Acad. Sci. 34: 322-329. 1944.
18. Report of the committee on nomenclature and classification of plant viruses. Phytopath. 33: 424. 1943.
19. Smith, K. M. A textbook of plant virus diseases. P. Blakiston's Son & Co., Inc. Philadelphia 615 pp. 1937.
20. Thornberry, H. H. A proposed system of virus nomenclature and classification. Phytopath. 31: 23. 1941.
21. Valleau, W. D. Book review of Holmes, F. O. Handbook of phytopathogenic viruses. Phytopath. 30: 456-457. 1940.
22. _____. Classification and nomenclature of tobacco viruses. Phytopath. 30: 820-830. 1940.
23. _____. The binomial system of nomenclature for plant viruses. Chron. Bot. 6: 223-224. 1941.
24. _____. Virus nomenclature and classification. Chronica Botanica. 7: 152-154. 1942.

THE PHLOROGLUCINOL TEST FOR DIAGNOSIS OF LEAF ROLL IN NETTED GEM POTATOES[1]

E. C. Klostermeyer

One of the problems in determining the effects of aphid control on the spread of potato leaf roll virus is the difficulty of making a definite diagnosis of the disease in the field. Although current season symptoms are prominent on the Netted Gem (Russet Burbank) variety in the Yakima Valley, other factors may produce similar symptoms so that one rarely can be sure of a diagnosis. Usually it has been necessary to take tuber samples from treated plots and grow them in the greenhouse or field before the extent of leaf roll spread could be determined.

Phloroglucinol was used by Sheffield (2) to stain necrotic phloem cells found in potatoes affected with potato leaf roll. Since no other abnormality caused necrosis confined to the primary phloem cells, the test appeared to be specific for leaf roll. In plants with chronic (secondary) leaf roll, the necrosis was most severe at the base of the stem. In artificially infected plants, necrosis was found to develop spreading upward from the place of inoculation. The phloroglucinol test showed phloem necrosis to be present in thirty-three varieties with chronic leaf roll symptoms. Necrosis was found in all parts of the plant except stolon, tubers, and roots. Wilson (3) used the test as an aid in diagnosing leaf roll in the Brownell and Up-to-Date varieties in Tasmania. He found that phloem necrosis was a constant specific character of leaf roll plants, and the rolling of leaves due to varietal character and that due to Rhizoctonia were not accompanied by necrosis. Bald, Norris, and Helson (1) also used the test to confirm leaf roll diagnosis.

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[1]Published as Scientific Paper No. 891, Agricultural Experiment Station, Institute of Agricultural Sciences, State College of Washington, Pullman.

To determine whether this method could be used to diagnose current season infection in the Netted Gem variety, tests were made on plants known to be infected with leaf roll. In this variety, phloem necrosis is prominent. In current season infected plants, it appears as brown, discontinuous flecking under the "bark" of the stem just below the ground level. The flecking is difficult to see in the apical portion of the plant, but application of the phloroglucinol test makes the necrosis visible as a red discoloration in the phloem. Phloem necrosis was found in all cases of chronic infection and was most abundant in the basal part of the stem. In plants with current season leaf roll, necrosis was prominent in the apical portion of the plant. Repeated tests showed the character to be a reliable means of diagnosing the disease. In one case, fifty consecutive plants from two rows of potatoes were rated as to leaf roll on the basis of external symptoms, and on the basis of the phloroglucinol test. In one row, eleven plants showed symptoms of leaf roll, and ten of these also had necrotic phloem. In the other row, three plants were rated as leaf roll according to external symptoms. Two of these gave a positive reaction to the phloroglucinol test. Plants in the first row, incidentally, during the season had eight times as many aphids per leaf as in the other row. None of the plants thought to be affected by fungus root rots had phloem necrosis, and no staining was noted in the phloem of any plant rated as healthy. The test was used successfully for diagnosing leaf roll in a large scale aphid control experiment. Tuber samples from this experiment were taken and will be planted so that the two methods of diagnosis may be compared.

Tubers from plants infected with leaf roll did not react to the test even when net necrosis was plainly visible. The test was not suitable for use on the White Rose variety except when the basal portion of the stem was examined.

The leaf roll test plant, Physalis angulata, reacts to the phloroglucinol test in the same manner as the potato. However, the inner phloem usually is most severely affected, rather than the outer phloem as in the potato. A small amount of necrotic phloem was present when the plants first showed symptoms (two weeks following inoculation by viruliferous green peach aphids), and became increasingly severe as the disease progressed. Necrosis was most prominent in the upper portion of the plants.

A method was devised to permit rapid sampling and examination. Samples were taken in the field by cutting off the apical 6 inches of a stem from each plant. The leaves were trimmed off and the stems held under refrigeration until they could be sectioned. Sections about 1/2 mm. in thickness were cut by hand through two nodes of the stem and skewered on an insect pin. They then were immersed in a solution of 1 percent phloroglucinol in alcohol for about 1 minute, after which they were transferred to concentrated hydrochloric acid until the xylem attained a red color. After rinsing in water, the sections were arranged on a microscope slide and examined at 40X magnification with a dissecting microscope. In healthy plants, only the xylem and occasional fibers stained red, whereas in plants with leaf roll, yellowish-red stained areas in the outer and inner phloem regions were readily apparent. Usually where one section had necrotic phloem, the other did also. The test depends on the reaction of phloroglucinol with lignin deposits in the necrotic phloem.

With the above method, about 100 samples can be examined in an hour when two men are employed in sectioning. A section cutting device, patterned after a vegetable slicer, has been devised which should permit direct sectioning in the field, thus further reducing the time needed for sampling.

The use of the phloroglucinol test on the apical portion of the plants makes possible the determination of leaf roll increase as the season progresses, since frequent sampling can be made without destroying the plant. It also makes possible an unbiased determination of the disease without the uncertainty connected with diagnosis based on external symptoms.

Acknowledgment

Part of this work was done on experimental plots of the U. S. Department of Agriculture, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, Division of Truck Crop Insect Investigations, Union Gap, Washington. The cooperation of B. J. Landis and K. E. Gibson of that Division is appreciated.

Literature Cited

1. Bald, J. G., D. O. Norris, and G. A. H. Helson. Transmission of potato virus diseases. 5. Aphid populations, resistance, and tolerance of potato varieties to leaf roll. Australia Counc. for Sci. and Ind. Res. Bul. 196. 1946.

2. Sheffield, F. M. L. Value of phloem necrosis in the diagnosis of potato leaf-roll. Ann. Appl. Biol. 30(2): 131-136. 1943.
3. Wilson, J. H. The use of the phloroglucinol test for diagnosis of leaf roll in potatoes. Jour. Austral. Inst. Agric. Sci. 14(2): 76-78. 1948.

IRRIGATION EXPERIMENT STATION, PROSSER, WASHINGTON

NUT DISEASES IN THE PACIFIC NORTHWEST IN 1949

P. W. Miller[1]

WALNUT DISEASES

Walnut blight (Xanthomonas juglandis (Pierce) Dowson). Walnut blight was widely distributed in the Pacific Northwest in 1949, causing greater than normal loss. In certain non-sprayed orchards in western Oregon, as much as 75 percent of the potential crop was lost from this disease. However, for the region as a whole it is estimated that about 25 percent of the potential walnut crop in non-sprayed orchards was either completely destroyed or the quality adversely affected by this disorder.

Mushroom root rot (Armillaria mellea Fr.). This disease caused the death of a limited number of seedling Persian walnut trees in western Oregon in 1949.

Leaf scorch (non-parasitic). This leaf disorder was widely distributed in the Pacific Northwest in 1949, occurring to a greater or less extent in practically all Persian walnut orchards in Oregon and Washington. In orchards on soil types very deficient in boron it was exceedingly prevalent, causing a significant decrease in the functional leaf area through death of the tissues and through premature defoliation. Applications of borax in sufficient amounts to the soil generally decreased the amount and severity of this disorder.

Black line (girdle) of grafted walnuts (non-parasitic). This disorder was responsible for the death of more grafted Franquette walnut trees in 1949 in the Pacific Northwest than any other cause. It was widely distributed, occurring to a greater or less extent in practically all walnut districts in the Pacific Northwest. All trees found affected were the Franquette variety grafted on Hind's black walnut rootstocks (Juglans hindsii Jeps.) or on hybrids of other species with this one.

Crown Rot (cause undetermined). A collar- and crown-rot of undetermined cause was found affecting a considerable number of Persian walnuts grafted on Hind's black walnut and on hybrid black walnut root stocks in western Oregon. Most of the affected trees were located in hill orchards on "heavy" soil types.

FILBERT DISEASES

Bacterial blight (Xanthomonas corylina (Miller et al.) Dowson). This disease was widely distributed in 1949, occurring to a greater or less extent in practically all filbert orchards in western Oregon. It was most prevalent in young orchards from one to three years of age, causing the death of many young trees. It also occurred in many older orchards where it caused the death of many buds and twigs.

Mildew (Phylactinia corylea Karst.). This disease occurred in greater or less amounts in many orchards in western Oregon in 1949. However, it was of no economic importance as the disease did not make its appearance until very late in the season. The infected leaves retained their normal green color until the end of the season and persisted on the trees until time of normal leaf fall.

Leaf scald (non-parasitic). This disorder occurred in varying amounts in many filbert orchards in western Oregon in 1949. However, it was not generally as severe this year as in 1948.

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[1]Plant Pathologist, U. S. Department of Agriculture, Agricultural Research Administration, Bureau of Plant Industry, Soils, and Agricultural Engineering, Division of Fruit and Vegetable Crops and Diseases, Oregon State College, Corvallis, Oregon.

Brown stain (non-parasitic). This disorder, characterized by the presence of a brownish liquid on the shell and an abortion of the embryo, was more prevalent in 1949 than for a number of years past. Crop losses from this disorder ranged from less than 1 up to 10 percent, the estimated average loss being around 3 percent.

Filbert shrivel (non-parasitic). This disorder, characterized by a shriveling of the kernels, was widely distributed in the Pacific Northwest in 1949, occurring to a greater or less extent in practically every orchard in Oregon and Washington. In general, this disorder was more prevalent than in 1948, causing greater than normal losses.

DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES

1949 PLANT DISEASE SURVEY FOR NEW MEXICO

Philip J. Leyendecker

Listed below are a number of unreported and unusual plant diseases which appeared in New Mexico during the 1949 growing season.

1. White rust; Albugo candida (Pers. ex. Chev) O. Kuntze on Sisymbrium irio (L.) Britt. A number of infected plants were found on the New Mexico A. & M. A. campus. Leaf infection was slight, however the entire inflorescence was deformed and overgrown by the pathogen.

1a. Albugo candida on Armoracia rusticana Gaertn., horse-radish. Many home garden plantings were severely infested this year in the vicinity of Las Cruces. Leaf surfaces were completely covered with pustules of the fungus.

2. Cabbage yellows; Fusarium oxysporum f. conglutinans (Wr.) Snyder & Hansen, which was reported for the first time in 1948 appeared again this season. Only small local areas of infection were found on previously infested land. Disease expression was most severe in low places where irrigation water had a tendency to collect. Cool soil temperatures which prevailed late in the season probably tended to reduce the parasitic activity of the pathogen.

3. Rhizoctonia solani Kuehn was found to be present in numerous flower beds causing a serious root rot of Ageratum conyzoides L.

4. Ashy stem blight; Macrophomina phaseoli (Maubl.) Ashby. was found to be responsible for root rot and stem blight of pinto beans. Seedling as well as stem blight was quite severe in fields at Tucumcari where the pinto bean is the principal cash crop. Some fields in which the disease was found had been cropped to beans and sorghum over 20 years. Most seedling injury caused by the pathogen has been previously attributed to Fusarium and Pythium.

5. A leaf spot of onion caused by Phyllosticta allii Tehon & Daniels is reported for the first time in New Mexico. Approximately 80 acres of Yellow Granos were seriously infected. Almost every plant in the field exhibited leaf lesions which was brought about by 10 days of unusually high humidity. The disease, however, was checked by the return of normal arid conditions before considerable damage was done.

6. Curly top; Chlorogenus eutetticola Holmes on pepper (Capsicum frutescens L.) was extremely severe this year. In large commercial plantings where the seed was field sown, 50 to 60 percent of the plants were severely infected. Many producers rogued late in order to eliminate infected plants, yet the disease incidence was very high. Infection of tomato was also much higher than in previous years. The high incidence of curly top was probably brought about by the mild winter and subsequent large population of leaf hoppers.

7. An unusual amount of neck bulb rot of White Grano onion was found to be caused by Rhizopus stolonifer (Ehr. ex Fr.) Lind. Infection occurred at time of harvest which accounted for 5 to 10 percent unsound bulbs. Most onions appeared to be sound until time of grading when the soft rot was detected at the neck end. Inspection of harvesting operations did not indicate that the bulbs were sun-scalded during harvesting.

8. Bacterial blight of cotton; Xanthomonas malvacearum (Smith) Dowson, which accounts for slight reductions in yield each year, approached an epiphytotic stage this year in the Pecos valley. Approximately 40,000 acres were affected. The infection ranged from slight to very severe. Small loci of infection were spread by violent wind and rain storms. Precipitation in the severely infected areas was about 50 percent above normal on July 15 at which time the disease was most severe. Reductions in yield would not have been as severe had it not been for an early frost which cut the growing season about 40 days. Damaged plants did not recover and set a normal crop. A survey revealed that about 1 percent of the acreage was planted with fuzzy seed. Approximately 95 percent of the acreage was the variety Acala 2815 or 1517A. Estimated reduction in yield was from 35 to 50 percent.

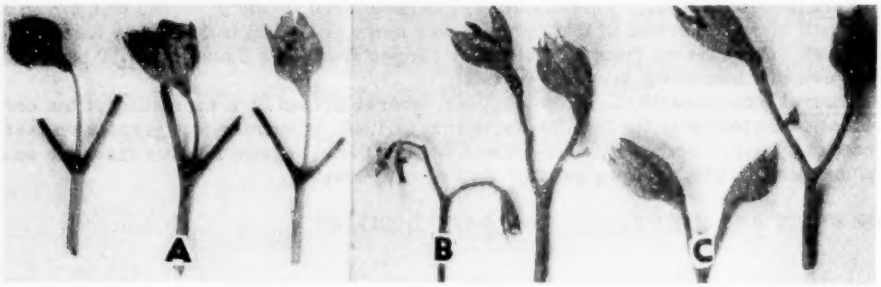

Figure 1. A. Infected pepper flowers showing enlarged ground-cherry like calyces. Calyces are hollow and are void of functional organs. B. Normal tomato flower. C. Infected tomato flowers showing enlarged calyces similar to (A) found in pepper.

9. What is thought to be an undescribed virus disease of Chile pepper (Capsicum frutescens L.) was observed in the breeding plots at the New Mexico A & M Horticultural Farm during 1948 and 1949. The disease causes a slight mottling and thickening of the leaves, however, the unusual symptom is the enlargement of the calyx and resulting sterility of the flower. The calyx of infected plants becomes enlarged and inflated, appearing very much like a normal calyx of the genus Physalis (ground cherry). The sex organs of infected flowers soon dry up and do not function, however, it was noted that early in the season a few abnormal pods did develop. During 1948, only two plants in a progeny row were found which developed these unusual symptoms and at that time it was thought to be genetically controlled. However, in 1949, infected plants appeared sporadically throughout the field in many of the progeny rows. Further observations will be made. Reports of the occurrence of this unusual condition on pepper in other localities would be greatly appreciated. A similar condition on tomato was also found in a field about 2 miles from the infected pepper field. Infected pepper and tomato flowers are shown in Figure 1.

DEPARTMENT OF BIOLOGY, NEW MEXICO EXPERIMENT STATION, STATE COLLEGE, NEW MEXICO

DISEASES OF SMALL GRAIN IN TEXAS IN 1949[1]

I. M. Atkins[2]

Plant diseases caused a greater loss to small grains in Texas in 1949 than in any year in the history of the State. Also the loss to the growers through reduced test weight, reduced yield, harvesting loss, and increased cost of harvesting, of a promising winter wheat crop on a large acreage, was by far the greatest in history. The previously largest percentage loss from wheat diseases was in 1935 when the crop was reduced by 15.5 percent. Owing to winterkilling and other factors, however, the wheat production in 1935 amounted to only 10,010,000 bushels. The damage from oat diseases was greater in both 1933 and 1934 than in 1949. Estimates of losses in those years amounted to 28 and 21 percent of the crop, respectively, with an estimated production about the same as the 1949 crop. The barley crop suffered a greater loss in 1935 when 9.2 percent of an estimated crop of 2,646,000 bushels was lost by diseases.

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[1]Contribution from the Texas Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture.

[2]Agronomist, Division of Cereal Crops and Diseases.

Estimated losses from small grain diseases in Texas in 1949.

Item	Central Texas	Rolling Plains	Panhandle	State	Loss in Bushels
	%	%	%	%	
Wheat:					
Leaf rust	20	20	5	11.1	12,436,350
Stem rust	11	5	4	4.8	5,845,100
Septoria	11	5	2	3.4	4,217,550
Loose smut	1	0.25	Tr	.15	179,310
Bunt	0	Tr	Tr	Tr	----
Others	3	2	.5	1.1	1,343,235
			Total	20.5	24,021,545
	Basis - 7,500,000 acres		June 1 Estimate 123,000,000 bushels		
Oats:					
Crown rust	11	5	1	9.0	3,166,800
Stem rust	10	5	1	8.9	2,932,800
Helminthosporium	8	1	0	3.6	1,170,000
Smut	0.5	0.5	0	0.4	175,500
			Total	21.9	7,445,100
	Basis - 1,360,000 acres		June 1 Estimate 35,360,000 bushels		
Barley:					
Leaf rust	3	Tr	0	0.9	26,400
Stem rust	Tr	Tr	0	Tr	----
Helminthosporium	10	2	0	3.7	105,600
Mildew	5	2	0	2.3	61,600
			Total	7.8	193,600
	Basis - 130,000 acres		June 1 Estimate 2,860,000 bushels		

The season of 1949 generally was favorable for the development and spread of diseases. The High Plains area received ample moisture in the fall and winter, resulting in the development of a large plant growth. Only the early maturity of the crop prevented serious losses from stem rust. On the other hand, the Rolling Plains and the Central Texas areas experienced the most severe fall drought in history. This resulted in irregular emergence within fields, very late emergence in many fields, and the sowing of a large acreage of spring-sown oats in North Central Texas. All these factors combined with a cool spring and favorable moisture provided favorable conditions for the spread of diseases. Since all varieties of wheat grown in Texas, except Austin, are susceptible to both rusts, the damage might well have been even greater.

Leaf rust (Puccinia rubigo-vera var. tritici) was the most important disease of wheat, although stem rust (P. graminis var. tritici) was more important in localized areas. Moderate to high infection of leaf rust was observed throughout the area from San Antonio south in early March. This infection was largely on Austin wheat, which until recently was highly resistant. Inoculum built up rapidly on wheat in the San Antonio area and in the southern part of the Rolling Plains area. Rust showers were very heavy during April and May. Counts on slides exposed for the Rust Prevention Service reached a maximum of 3,120,000 spores per square foot on April 18 at Temple, Texas, and of 2,845,000 spores per square foot on April 5 at Chillicothe. The disease increased progressively northward as the crop developed, spreading into the Texas Panhandle in early June. Damage ranged from severe to moderate in all except the Panhandle area with certain parts of that area also damaged. There was fear among farmers that Austin wheat would not even head but a small crop was finally matured. Leaf rust combined with Septoria diseases caused serious losses to many fields in the Rolling Plains area. The weather continued favorable for leaf rust throughout April and May. Westar wheat remained fairly resistant to leaf rust, giving it a distinct advantage in many areas this season.

Stem rust developed more slowly during the season. Two factors probably contributed to this: (1), The cool weather in April and May and (2), the large acreage of Austin wheat in the

San Antonio area which retarded the general spread. In North Central Texas, where the crop was late in maturity, owing to later emergence, serious damage was caused by the disease. The disease spread into the Rolling Plains area and from there into the southern part of the High Plains area where moderate damage resulted. Considerable damage also occurred in an area east of Amarillo in Potter, Armstrong, and Grey Counties.

Septoria tritici and S. nodorum caused material losses in all parts of the State. Damage from these diseases was confused with rust losses in many instances and was difficult to determine. Loose smut (Ustilago tritici) was present in most fields of Central Texas mostly in trace amounts. Most fields of durum wheat in the San Antonio area had considerable loose smut. Several fields with light to moderately high bunt (Tilletia sp.) infection were observed in the Rolling and High Plains areas.

Although the oat crop in the two principal growing areas was irregular and late in emerging because of a fall drought, the crop recovered remarkedly well and with favorable spring conditions gave promise of an excellent yield. Cool weather prevailed and there was ample moisture for the late-maturing crop. Crown rust (Puccinia coronata) was observed in the San Antonio area and south to the Rio Grande Valley in early March and probably had been present there all winter. Stem rust (P. graminis var. avenae) was found in a few fields at that time. The presence of race 45 of crown rust was indicated by infection on Bond derivatives. Spread of crown and stem rust of oats, however, was rather slow in April and it was not until May that the epidemic gained headway. The large acreage and irregular maturity of the oats favored the spread of diseases. Both rusts reached epidemic proportions over the area before the crop matured. However, the damage to the crop was not proportional to the amount of infection observed. On farms and in experimental plantings many Red Rustproof strains and Bond derivatives that were given infection readings near 100 percent, produced good yields, and the quality was damaged only moderately. In general, the damage resulted largely from lodging of the crop with the resulting increased cost of harvesting and accompanying loss. Both rusts also spread to the High Plains area where experimental oats were heavily infected.

Helminthosporium blight (H. victoriae) was observed on susceptible varieties in experimental plantings and in some commercial fields in Central Texas. Much of the acreage in this area consisted of Red Rustproof strains, which are resistant. In South Texas, particularly along the Coast, both Helminthosporium blight and H. sativum were damaging oats. The acreage in that area is small, however. Many fields having rather high smut (Ustilago spp.) infection were observed in South Central Texas. This was especially true of fields of Fulgrain oats.

The barley acreage in Texas was small in 1949. Leaf rust became prevalent earlier than normal and caused some damage. Helminthosporium and mildew were observed in nearly all fields, causing moderate damage in some.

Estimates of losses from diseases, shown in the accompanying table, were computed after averaging estimates of workers in the area and of those traveling the area. Losses were computed by areas in proportion to the acreages involved, using only the State average yield as a basis.

TEXAS AGRICULTURAL EXPERIMENT STATION AND THE DIVISION OF CEREAL CROPS AND DISEASES, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

OAT DISEASES IN ARKANSAS 1948-49

H. R. Rosen

Following a very dry September and almost an equally dry October for a considerable part of the State, fall seeding of oats in 1948 was somewhat reduced in acreage and the stands were much retarded, often uneven and late. This was followed by a very wet November for about three-fourths of the State in which stands were further reduced, while dry weather continued to hamper oat fields in the remainder. January precipitation was exceptionally heavy and apparently contributed to additional drowning-out of stands, especially in the rice area. Along with this, a heavy infestation of aphids occurred in several parts of the State, especially in Arkansas County, where the oat acreage is large. Along with adverse weather and aphid infestations, two additional factors other than parasitic diseases apparently contributed considerably to reduced yields: first, nitrogen starvation, and second, a heavy infestation of army worms, mainly in the eastern part of the State. The first of these appeared to be statewide in occurrence, outside of the rice area. During the fall and early winter more specimens were received from county agents showing nitrogen deficiency than in any year previous. In many instances this was confused with parasitic diseases, especially Helminthosporium blight. The relatively wide occurrence of this deficiency was probably associated with three factors, the exceptionally heavy yields of the preceeding crops of corn, hay, and other crops, partial lack of nitrogen fertilizers, and a very dry fall.

While parasitic diseases were common throughout the State, as appeared evident in a statewide survey conducted in May and June, it seems that adverse weather, nitrogen starvation, and insect attacks were more important in reducing yields in 1948-49 than parasitic diseases. In any case, the average State yield of 27 bushels per acre in 1949 marks the first year in the last four in which there was no increase in the average yield over the immediate preceding years, and actually showed a reduction of 5.5 bushels from the 1948 yield.

Anthracnose. By far the most common and probably the most damaging parasitic disease in 1949 was anthracnose (Colletotrichum graminicolum). This is the fourth successive year in which this disease appeared so abundant. Actually it seemed more prevalent than in 1948 and gave the impression of a continuing spread in prevalence and in intensity (since 1946). Even on Red Rustproof strains, which usually show smaller lesions than the commonly grown Victoria derivatives or on the Bond derivative, Taggart (see PDR 33: 31-35, 1949), there appeared to be a greater number of infections than in the past. However, most of these infections, in the form of blade, sheath, and rachis spots and streaks, appeared some time after heading, so that the reduction in yield which they may have occasioned was probably not so great as the prevalence might indicate.

Just the same, anthracnose, without much doubt, was responsible for appreciable reduction in yield in the State as a whole. In some fields, notably where rotation was practiced and where the fields were somewhat isolated, the disease appeared late and probably caused little damage. In other fields, as in one observed in Drew County on Victorgrain, May 18, almost all of the leaf area was killed when the plants were in the milk stage and the grower probably suffered a loss of at least 20 percent of the yield. The whole field of about 20 to 30 acres looked as if some fiend had maliciously singed every leaf while sparing most of the panicles and the straw. Imagine a field with the panicles green and the leaves brown!

Leaf spot. For several years attention has been called to the importance of Helminthosporium leaf spot (Pyrenophora avenae) in Arkansas (PDR 26: 455-457, 1942; 29: 286-287, 1945; 30: 364-368, 1946; 31: 471-475, 1947; 33: 31-35, 1949) but if anyone has read these reports (or the comparable reports on anthracnose) and has found this disease to be of importance in their State, they have pretty largely failed to publish their findings. It is amazing how "writer's cramps" prevail among plant pathologists. The very few reports on this disease that have appeared in the Plant Disease Reporter or in any other publication known to me would seemingly indicate that it is of minor or no importance. Yet it appears (mostly by hearsay) that it is important in other southern States, as for example, in Florida.

Leaf spot was just as abundant in 1949 as in previous years. It was exceedingly prevalent at heading time at the Main Station, Fayetteville, and was found in every oat field that was examined in the State. There is evidence that the disease appeared first on volunteer oats in the seedling stage, whence it spread to nearby cultivated fields in the fall of 1948. Even fields that had been sown with seed treated with an organic mercury compound showed considerable leaf spot in the fall of 1948 (as well as the current crop seeded in the fall of 1949). The apparent reason for this is that oat stubble and straw form an excellent medium for the saprophytic growth of the causal organism which is one of the commonest fungi found on these plant parts in Arkansas. From such stubble or straw, the spores are probably carried by wind or rain,

and upon reaching an oat field it takes but a few hours for the spores to germinate and penetrate seedling tissues in the presence of a film of rain or dew. This is especially applicable to the imperfect or Helminthosporium stage, although perithecia with viable ascospores corresponding to the European descriptions of this fungus are also very common on oat stubble. Infected seedling leaves tend to die early although the leaf may not show more than one to a few, small, purple-black spots. Within a few days after the spots appear, the infected leaf often turns yellowish or red and gradually dies. Usually, however, artificial inoculation with atomized spore suspensions in the greenhouse seemingly causes more rapid death to seedling leaves than occurs under natural conditions. Furthermore, as the tillering or rosette stage is reached, infected leaves apparently tend to become longer lived and have been traced by the writer through the winter into the spring season.

In 1949, approximately 10 to 20 percent of the leaf area of all oat varieties observed was infected with leaf spot when the plants were mostly in the milk stage. Since the rosette leaves were nearly all dead at that time, it is difficult to tell how much additional damage was caused. The only oat varieties that appeared to show any high degree of resistance were all new selections confined to the nursery, and even these showed some degree of susceptibility as the plants reached the milk stage. One of these, with the breeding number 746-5-19-8, representing the parentage Mutica Ukraina X (Fulghum-Victoria X Bond-Iogold), showed no infections in the field until May 28 when the plants were in the milk stage, but from then on the infections became fairly abundant although still much less than on the variety Lee growing close by. This was typical of a number of other breeding selections that seemingly showed resistance or escaping qualities in the early stages of growth but became at least partly susceptible as the plants reached the milk stage.

Helminthosporium blight. As in the past few years, there was comparatively little blight (H. sativum var.) on winter oats in 1949, and since the acreage of susceptible varieties of spring oats was considerably reduced, not much was found on these. In the varietal field tests, conducted jointly with the Agronomy Department, at the Main Station, Fayetteville, and at five branch stations, Victoria derivatives of winter oats have continued to yield as well as or better than the best yielding Bond derivatives, despite this disease. In 23 varieties or selections of winter oats grown in one-fiftieth-acre drill plots replicated six times at Fayetteville, the five highest yielding varieties in bushels per acre were Stanton 4, 74.8 bu.; Traveler 15-8, 74.2 bu.; Traveler, 72.3 bu.; Taggart, 72.0 bu.; and Letoria, 71.4 bu. There is no significant difference in yield between these varieties, Taggart being the only Bond derivative represented in these top yielders, the rest being Victoria derivatives. Four other Bond derivatives were present in the test.

Smuts. (Ustilago spp.) As in 1948, there was an average of approximately 5 percent smut in the State as a whole. Traveler, DeSoto, and several other Victoria derivatives were found to show more smut than in any year previous, indicating the spread of relatively new races, mostly of the loose smut type (U. avenae). Likewise, Red Rustproof strains such as Ferguson 922 and Nortex showed more smut.

Crown rust (Puccinia coronata). While there was considerably more crown rust in 1949 than in the year previous, the State as a whole suffered very little loss from this disease. However, wherever a Bond derivative was grown, mostly at the experiment station test plots, there was as much as 30 to 40 percent leaf area infected on some of these, indicating the presence of race 45 and similar races, while older rust-susceptible types such as Lee and Fulghum were read as high as 75 percent infection at the Fruit and Truck Branch Station, Hope. Since none of these are grown commercially to any extent, they do not reflect the average amount in the State as a whole, although they do indicate what is likely to happen if growers return to the older susceptible varieties.

In contrast to winter oats, spring oats as a whole showed much more crown rust, many of the plots at the University Farm, Fayetteville, having as much as 40 percent of the leaf area infected when the plants were in the early milk stage and close to 100 percent (modified Cobb's Scale) when the plants were reaching maturity.

Stem rust (Puccinia graminis var. avenae). There was so little stem rust present in 1949 that it was often necessary to search considerably to find a single pustule. This appeared to be true of both winter and spring oats.

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GRAIN SORGHUM DISEASES IN GEORGIA--1949[1]

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Humid weather throughout the summer combined with early planting favored the development of a number of leaf, head, and stalk diseases of grain sorghums in variety tests planted in Georgia in 1949. The severity of some of these diseases permitted observations on differences in varietal resistance to diseases that may be of assistance in the selection of grain sorghum varieties adapted to Georgia conditions.

The grain sorghum variety tests from which notes on diseases were taken were conducted by Myron B. Parker, Julian P. Craigmiles, and U. R. Gore of the Georgia Experiment Station Agronomy Department. Tests were located at Sandersville, in the Coastal Plain; Experiment, in the Piedmont; and Rome, in the Appalachian Valley and Ridge Province of North Georgia. The twelve varieties listed in Table 1 were represented in each test. Each variety was planted in plots of four rows, each 40 feet long. The plots were replicated four times at each location. Planting dates were May 16 at Sandersville, May 20 at Experiment, and June 4 at Rome.

The test at Experiment was observed throughout the season, and the varieties were rated for disease resistance on September 19. Ratings were made in the test at Sandersville on September 29 and in the test at Rome on October 7. The data obtained are summarized in Table 1. These data are based merely upon estimates of the percent damage caused by each disease. Consequently, they probably are not of great significance except when they indicate a striking difference in susceptibility among the varieties.

Although no observations on seedling diseases were made, the excellent stands of sorghum at all locations indicated that seedling diseases were not an important factor in sorghum production in these plantings. Several leaf diseases were well developed at Experiment and Rome, especially toward the end of the season; but these diseases were present only in trace amounts at Sandersville. Bacterial stripe, zonate leaf spot, gray leaf spot, anthracnose, and rust were important foliage diseases on some or all varieties. Rough spot was uncommon and helminthosporium leaf blight was practically absent. Bacterial streak and bacterial spot were not found. Estimates of damage caused by these leaf diseases are based upon the percentage of leaf area infected. These diseases doubtless had some effect on yield at Experiment and Rome. In the absence of experimental data, however, it is impossible to estimate the reduction in yield of grain resulting from these leaf diseases of sorghum. No head smuts were observed; but head mold, with which a number of fungi were associated, completely destroyed the grain at Experiment and Sandersville and probably reduced yields at Rome. Differences in susceptibility to head mold were apparent among the varieties at Rome. The tests at Experiment and Sandersville were free of stalk rots. At Rome, stalk rots were serious, making harvesting difficult and causing losses in grain. Stalk rots that were determined at this location, listed in order of their probable importance, are: anthracnose stalk rot, charcoal rot, rhizoctonia stalk rot, and southern sclerotial rot.

Leaf Diseases

Bacterial Stripe (Pseudomonas andropogoni (E. F. Sm.) Stapp).--Bacterial stripe was the most important grain sorghum disease during the early part of the summer. It was observed in the planting at Experiment early in July. Hegari and Early hegari were the only varieties that appeared to be highly susceptible to this disease. Throughout the summer it was the most important disease on these two varieties. Damage at Experiment was estimated at 19 percent on Early hegari and at 12 percent on hegari. Trace amounts were found on all other varieties except Combine kafir No. 44-14, Double Dwarf Yellow Sooner, and Texas milo. At both Sandersville and Rome, bacterial stripe was observed in trace amounts on Early hegari and hegari. It was not present on any other variety at these locations.

Symptoms appeared in the form of linear, dark-purple stripes 7-75 x 0.5-2mm. in size. The stripes became as much as 42 cm. long and 4 mm. wide, being limited laterally by the veins. They often extended almost the entire length of the leaf and became confluent to cover large areas with a dark-purple discoloration. Conspicuous bright- to dull-red, flaky, orbicular crusts of dried bacterial exudate could usually be found on the lower surface of infected leaves.

Zonate leaf Spot (Gloeocercospora sorghi D. Bain & Edg.).--Zonate leaf spot was the most common disease on all sorghum varieties during the latter part of the summer. Although

[1]Paper No. 192, Journal Series, Georgia Experiment Station.

Table 1. Summary of estimates of percent damage to grain sorghums caused by various diseases in variety tests at three locations in Georgia in 1949.

Variety	Bacterial stripe	Zonate leaf spot	Gray leaf spot	Anthracnose	Rough spot	Rust	Stalk rot	Lodging	Head Mold	Grain production
Hegari	T-12[a]	T-6	0-3	0-30	0	T	0-1	0	1-100	G-VP[b]
Early hegari	T-19	T-10	T-4	0-50	0	T	0-10	0-10	T-100	G-VP
Combine kafir No. 44-14	0	T-4	T-15	0-20	0-T	T-1	0-80	0-40	3-100	G-VP
Imperial kafir	0-T	T-6	2-20	T-10	0-T	T	0-T	0	2-100	G-VP
Imperial kafir No. 360	0-T	T-1	2-35	T-20	0	T-3	0-T	0	3-100	G-VP
Caprock	0-T	T-15	0-2	0-70	0-T	T	0-100	0-3	60-100	G-F
Double Dwarf Yellow Sooner	0	T-30	T-2	T-13	0-T	0-T	0-10	0-3	70-100	G-P
Double Dwarf White Sooner	0-T	T-10	T-5	0-10	0-T	0-T	0-10	0-T	40-100	G-P
Martin's Combine milo	0-T	T-9	0-T	T-50	0	0-T	0-70	0-5	2-100	G-VP
Double Dwarf milo No. 38	0-T	T-7	T-2	T-7	0-T	0-T	0-1	0-T	70-100	G-P
Texas milo	0	0-T	T-5	0-T	0	0	0-40	0-40	30-100	G-VP
Plainsman	0-T	0-8	T-1	0-60	0-T	0-T	0-7	0-7	70-100	G-F

[a] T-12 = Trace to 12 percent damage, indicating variation in severity of disease in tests at Sandersville, Experiment, and Rome, Georgia.

[b] G-good, F-fair, P-poor, VP-very poor.

there seemed to be variations in susceptibility to this disease, there was too much variation from location to location to permit a satisfactory ranking of the varieties. Caprock, for example, appeared to be the most seriously infected variety in the test at Experiment, damage on this variety being estimated at 15 percent. Double Dwarf Yellow Sooner ranked second in susceptibility in this test with a rating of 10 percent. At Rome, however, only a trace of zonate leaf spot was found on Caprock, while damage was estimated at 30 percent on Double Dwarf Yellow Sooner. Texas milo appeared to be the most resistant variety. Only a trace of zonate leaf spot was found on this variety at Experiment, and it was free of this disease at Rome and Sandersville.

The lesions were large, irregular, circular or semicircular blotches. The blotches were dark-red or purple irregularly marked with tan spots and partial rings that gave the blotch a zonate appearance although complete rings were rarely formed. Sporodochia of the causal fungus appeared usually on the upper surface of the blotch as slimy, salmon-colored masses visible under the hand lens or, when well developed, to the unaided eye. They were occasionally found in the field but developed more abundantly on infected leaves kept in a moist chamber for one or two days. After its death, infected tissue turned grayish-tan and was dotted with innate sclerotia appearing as dark-gray or black specks in the dead tissue.

The sporodochium of Gloeocercospora sorghi consisted of a flat, short-stipitate, orange, plectenchymatous stroma composed of hyphae emerging through a stoma and bearing a cluster of conidia over the upper surface. The conidia were attenuate-obclavate, hyaline, and many-septate. They measured 19.6-148.4 x 2.8 μ (Av. 25 = 45.92 x 2.8 μ). The sclerotia were hemispherical or disc-shaped bodies formed beneath the lower epidermis of the host leaf and occupying 1/2 to 2/3 of the width of the mesophyll. They measured 117.6-134.4 x 70.0-98.0 μ . They were composed of a homogeneous mass of extremely thick-walled, hyaline, round to polygonal parenchyma cells. The peripheral cells became dark-brown, forming a wall-like layer. At the flattened apex of the sclerotium, a stubby papilla projected into a cell of the lower epidermis.

The fungus was not obtained from plantings of infected tissue. Isolates from single conidia produced a fluffy, white, loosely appressed mycelium over the surface of 2.5 percent malt agar. Scattered orange wefts appeared in the mycelium, but no conidia were found in culture. After several weeks, numerous black, globose sclerotia of various sizes formed in large numbers over the surface of the agar.

Gray Leaf Spot (Cercospora sorghi Ell. & Ev.).--Although gray leaf spot occurred on all sorghum varieties planted, it was an important disease only on varieties of kafir. Imperial kafir and Imperial kafir No. 360 were the most severely infected varieties, estimates of damage varying from 2 percent at Sandersville to 20 percent at Rome for the former and from 2 percent at Sandersville to 35 percent at Rome for the latter. Estimates varied from a trace to 15 percent for Combine kafir No. 44-14, but the difference between this variety and Imperial kafir is probably greater than that indicated by these figures. Although gray leaf spot was the most serious leaf disease on Imperial kafir, its effect on yield probably was not great since it developed late in the season. The outbreak of this disease occurred in September and October after the grain was nearly mature. Gray leaf spot was a minor disease on all other varieties, Martin's Combine milo appearing to be the most resistant variety.

The first symptoms of gray leaf spot were small, circular, purple spots 0.5-1.5 mm. in diameter. As the spots enlarged they were limited laterally by the veins so that they became rectangular and measured 2-21 x 1-4 mm. They often coalesced to form long streaks. Usually the spots were uniformly dark-purple; sometimes an oblong area in the center of each spot became pinkish-tan. Such spots when coalesced end to end gave the effect of a chain or when densely present gave large areas of the leaf a checkered appearance. On varieties of kafir the whole leaf became covered with purple streaks. As the leaves died back, the blade turned grayish-tan heavily marked with faded purple spots and streaks. Under the hand lens fine longitudinal lines of dark-brown conidiophore tufts were visible on both surfaces of the spots. Under humid conditions hyaline conidia were produced in such numbers that the spots were covered with a downy white fuzz, and the whole plant had a silvery appearance from a distance.

The conidiophores of Cercospora sorghi emerged in fascicles from small, dark-brown, globular, plectenchymatous stromata. They were long-cylindrical, unbranched, geniculate and bearing conspicuous, circular conidial scars toward the apex, septate, and smoky-brown in color. They measured 44.8-112.0 x 4.5-5.3 μ. The conidia measured 28-106.4 x 4.5-6.7 μ (Av. 25 = 75.15 x 5.40 μ). They were attenuate-obclavate, hyaline, 3-12-septate, and provided with a circular hilum at the rounded basal end. Single-conidium isolates of the fungus on 2.5 percent malt agar formed a dark-gray to black surface layer of mycelium. Over the dark surface layer there was a fluffy growth of white aerial mycelium forming a continuous layer at the center of the colony but being reduced to scattered white wefts toward the periphery. No conidia were observed in culture.

Anthracnose (Colletotrichum graminicolum (Ces.) G.W. Wills.).--Anthracnose developed rapidly in late September and October. The grain had matured by this time; consequently, this disease probably had little influence on yields although it caused considerable killing of leaf tissue. Since it developed late in the season when many of the leaves were dying naturally, it was difficult to estimate the damage it caused. Although there were great variations among estimates for the varieties, little can be concluded as to relative resistance. Texas milo, however, appeared to be highly resistant to anthracnose at all locations.

When this disease first appeared, the lesions occurred principally on the midribs. They began as round, dark-red spots that, as they enlarged, became elliptic and as wide as the midrib. The color usually faded to reddish-tan, buff, or pale yellow; and the lesions were covered with black, setose acervuli. The lesions on the blades were tiny red to purple spots that enlarged until they measured 1.5-5 x 1.2-3 mm. The centers usually turned buff, resulting in an eye-spot with a broad or narrow purple border. Black acervuli were present on both surfaces of the spots. In October, the blade lesions became more severe, forming large, grayish-tan, orbicular or broad-elliptic spots that measured 7-10 x 5.5 mm. and often coalesced to form larger blotches. As the leaf died back the whole blade turned grayish-tan mottled with black patches of acervuli. Irregular purple blotches bearing acervuli formed on the leaf sheaths and on the peduncles. The pith of the peduncle under the blotches was red. The dead peduncles turned straw-colored marked with black patches and bands of acervuli.

The acervuli of Colletotrichum graminicolum consisted of a brown, plectenchymatous stroma formed within the epidermal cells. Hyphae from this stroma emerged through the outer walls of the epidermal cells and formed a flat layer of hyaline, rounded cells. The conidiophores were oblong cells projecting from this layer. They measured 8.4-11.2 x 5.0-5.6 μ. Each conidiophore budded out conidia singly from the apex. The conidia were fusoid, typically falcate with hooked, pointed ends, hyaline, and non-septate. They measured 16.8-28.0 x 4.2-

6.4 μ (Av. 25 = 24.05 x 5.21 μ). They usually contained several conspicuous globules. Interspersed among the conidiophores were numerous erect, dark-brown setae that tapered from the base to sharply-pointed tips. They were 2-5-septate and measured 70.0-193.2 x 5.0-8.1

Isolates in culture on 2.5 percent malt agar formed a fluffy white mycelium that soon became gray and finally almost black, especially at the surface of the agar, and almost filled the culture tube. Black specks in the gray aerial mycelium proved to be wefts of hyphae bearing conidia abundantly. The conidia were similar to those produced in the field. They measured 14.0-22.4 x 4.2-5.6 μ (Av. 25 = 18.90 x 4.98 μ).

Rough Spot (Ascochyta sorghina Sacc.).--Rough spot was present in trace amount on several varieties in the tests at Experiment and Rome during the summer and fall. There was too little of the disease to permit rating the varieties for resistance. The small amount of this disease is probably explained by the fact that the tests were on land that had not been planted to sorghum previously. Rough spot appears to be a disease of potential importance on sorghum in Georgia.

The first symptoms of rough spot were small, reddish, discolored spots 2-3 x 2 mm. in size. The conspicuous, black, superficial pycnidia of the causal fungus formed immediately, often before the discoloration was apparent and usually when the reddish discoloration was barely visible. The pycnidia formed on either the upper or lower surface of the spots, usually on the upper surface, giving the leaf a rough, sand-papery feel. They broke off easily leaving tiny white craters surrounded by a black rim. The spots enlarged until they became broad-elliptic and measured 8-14 x 4-8mm. Sometimes the spots were uniformly dark-red to purple; usually the centers became tan with a dark-red to purple border. The spots coalesced, forming extensive tan blotches outlined by a narrow, dark-red border. Finally whole leaves died and turned brown and were covered with pycnidia.

Ascochyta sorghina formed a flat, subcuticular, plectenchymatous stromal crust that was at first hyaline but soon became dark brown. At points the epidermal cells were invaded and disintegrated, and globular stromata were formed in the disintegrated cells. These stromata grew out through the subcuticular crust and the cuticle to form the globular, superficial pycnidia. The pycnidia were 138.0-262.2 μ in diameter and were made up of parenchymatous cells. The peripheral cells turned dark brown to form a wall layer. The pycnidial cavity was filled with hyaline, 1-septate, oblong, irregularly-shaped and straight to slightly curved conidia that measured 14.0-22.4 x 5.6-9.2 μ (Av. 25 = 18.93 x 7.84 μ). During late fall conidia were rarely produced. The pycnidia consisted of a uniform mass of thick-walled, hyaline, rounded parenchyma cells and resembled sclerotia. The fungus was not obtained in culture.

Leaf Blight.--In October a high percentage of the leaves on all varieties were completely dead or scorched at the tips and along the margins. At Sandersville a few conidia of Helminthosporium turcicum Pass. were found on several such leaves. However, two additional Helminthosporium spp. as well as other fungi were present in greater abundance, and it is doubtful that helminthosporium leaf blight occurred in more than barely perceptible traces. The scorch of these leaves is more probably attributable to physiologic conditions since the plants were over-mature at this time.

Rust (Puccinia purpurea Cke.).--Rust was present during the late summer and fall on almost all varieties, but it was not serious enough to make ratings given the varieties of much significance. Varieties of kafir appeared to be the most susceptible to rust, Texas milo the most resistant.

The symptoms were small, elliptic, dark-red to purple spots 1-2.5 x 0.5-1.5 mm. in size. On the lower surface of the spot a single uredium of about the same size as the spot developed. The epidermis was ruptured to expose a fluffy mass of reddish-brown uredospores. The uredia on the upper surface were poorly developed and inconspicuous. Telia developed later among the uredia. Apparently, some of the uredia were converted to telia. The telia consisted of a low, compact, almost smooth, purplish-black mass of teliospores. Numerous spots caused the death of areas of the leaf.

The uredospores were 1-celled, subglobose, oblong, or obpyriform, thin-walled, light yellowish-brown, minutely echinulate, and borne on long hyaline, non-septate stalks. They measured 36.4-44.8 x 23.2-30.2 μ (Av. 25 = 40.32 x 27.55 μ). Clavate, hyaline, non-septate, thick-walled paraphyses were produced at the periphery of the uredium. The teliospores were oblong, 1-septate, slightly constricted at the septum, thick-walled, and dark reddish-brown. They measured 40.6-56.0 x 25.2-28.0 μ (Av. 25 = 49.39 x 26.94 μ).

Head Mold

Although grain production of all varieties was good at Rome, it was poor at Experiment and Sandersville. The causes of this failure of grain production were not determined. However, there was evidence that the sorghum midge caused some damage, and birds consumed a large amount of the grain at Experiment. Rain during the flowering period may also have been a contributing factor. The grain that was produced was largely destroyed by molds, resulting in complete losses at Sandersville and Experiment and in reductions in sound grain at Rome. Early planting dates, resulting in the grain ripening during periods of warm humid weather probably were responsible for this serious development of head mold. Farmers' fields of sorghum that were planted later in the same areas were not seriously affected. It seems, therefore, that later planting largely controlled head mold in 1949. Head mold, however, can be expected to present a problem whenever conditions favorable to its development prevail immediately before harvest time regardless of planting date.

The grain of all varieties at Sandersville and Experiment was attacked by molds. At Rome, however, where conditions apparently were not quite so favorable for the development of molds, differences in susceptibility to head mold were apparent among the varieties. At Rome hegari, Early hegari, Imperial kafir, Imperial kafir No. 360, and Martin's Combine milo showed a high degree of resistance as compared with the remaining varieties.

The fungi associated with head mold, listed in order of abundance, were: Corethropsis sp., Fusarium spp. (principally F. moniliforme Sheld.), Curvularia sp., Gibberella zeae (Schw.) Petch, Colletotrichum graminicolum, and Penicillium spp. Although they were not observed on the grain, Glomerella cingulata (Stonem.) Sp. & v. Schr., Alternaria sp., and Rhizopus sp. were isolated from surface-sterilized grains. Unmolded grains were commonly covered with tiny black pimples. These proved to be pycnidia of Phoma sp. sparingly mixed with mature perithecia of Mycosphaerella sp. At Experiment Corethropsis sp. was the most common mold with Fusarium spp. and Curvularia sp. next. Corethropsis sp. was the most abundant also at Rome with Curvularia sp. and Fusarium spp. following in this order. At Sandersville, however, Curvularia sp. was the most abundant followed by Fusarium spp., and only a trace of Corethropsis sp. was found. The remaining fungi were sparingly present at all locations. The appearance of the moldy heads varied, of course, with the types of fungi present. Worms also were present in the moldy heads and added to the damage.

Isolations from surface-sterilized grains indicated that, regardless of the fungi present on the grain, Fusarium spp. (principally F. moniliforme) were the ones most commonly present in the seed. Grains were dipped in 95 percent alcohol for 10 seconds, immersed in 1:1000 mercuric chloride for 2 minutes, washed in sterile water, and planted on water agar. A lot of 80 grains, including 10 infected with Fusarium spp., 20 with Corethropsis sp., 30 with Curvularia sp., 10 with Colletotrichum graminicolum, and 10 apparently uninfected, were treated in this manner. Of these grains Fusarium spp. were obtained from 74, Curvularia sp. from 25, Corethropsis sp. from 13, Penicillium sp. from 3, Alternaria sp. from 2, and Rhizopus sp. from 8. Fusarium spp., alone or mixed with other fungi, were obtained from almost all grains whether other fungi were present on the surface of the grain or the grain appeared to be uninfected. Corethropsis sp., although abundant on the heads, was not commonly isolated from the surface sterilized grains. It appears, therefore, that Fusarium moniliforme was the most important fungus associated with head mold, being present even in apparently sound grain.

Corethropsis sp.--The fungus most abundantly present on sorghum heads at Experiment and Rome and largely responsible for their appearance was tentatively placed in the genus Corethropsis. If this disposition of the fungus is correct, it probably represents an undescribed species of the genus. It covered the entire head with a mealy white growth. Under the hand lens the surface of the grain appeared densely covered with short white hairs bearing white beads at their tips. These were the conidiophores of the fungus. The conidiophores were simple, erect branches from the hyaline surface mycelium. They were hyaline, 1-7-septate, and measured 226.8-386.4 x 8.4-9.2 μ . The conidia were borne in an elliptical head at the apex of each conidiophore. The fertile portion of the conidiophore was 8.4-11.2 μ in diameter; that is, it was not swollen or only slightly swollen and club-shaped. This region was densely covered with spine-like sterigmata 2.8-5.6 μ long. The conidia were borne singly on the sterigmata. They were egg-shaped, non-septate, hyaline, and measured 14.0-20.4 x 8.4-13.2 μ (Av. 25 = 18.0 x 10.78 μ). The conidiophores frequently proliferated at the tips to form successive elliptical conidial heads alternating with short sterile segments. Isolates in culture formed a loosely-appressed, white mycelium beaded with conidial heads. Conidia similar to those produced in the field were formed abundantly in culture.

Curvularia sp.--This fungus infected individual and often scattered grains in the head, covering the grain with a thick, velvety, dark-olive layer. This layer was made up of conidiophores which, although they were very long, were usually unbranched. The conidiophores measured 483-583 x 5.6-8.4 μ. They were many-septate, dark-brown, and geniculate and bearing circular conidial scars in the apical region. The conidia were broad-fusoid, rounded at both ends, with a circular hilum at the basal end, 3-septate, and measured 28.0-50.4 x 14.0-21.0 μ (Av. 25 = 39.31 x 17.53 μ). They were olive-brown, the two middle cells being swollen and more deeply colored than the end cells. The conidia were straight or grotesquely bent. In culture the fungus produced a dark-gray, fluffy mycelium that almost filled the culture tube. Conidia developed in large numbers.

Fusarium moniliforme.--F. moniliforme infected individual grains, covering them with a continuous or areolate crust of salmon to orange sporodochia. This also was the fungus most commonly isolated from surface-sterilized grains. In culture it formed a loosely-appressed, white to pinkish mycelium. The agar beneath the mycelium was stained a dark-red. Conidia were scattered on the mycelium. They were cylindrical, tapering to pointed ends, straight or slightly curved, 1-6-septate (usually 3-5-septate), and hyaline. Measurements were as follows: 3-septate conidia, 19.6-44.8 x 3.1-3.9 μ (Av. 10 = 37.52 x 3.30 μ); 4-septate conidia, 33.6-50.4 x 3.1-3.4 μ (Av. 10 = 44.80 x 3.16 μ); 5-septate conidia, 44.8-58.8 x 3.1-4.2 μ (Av. 10 = 51.66 x 3.25 μ). Microconidia were produced abundantly in chains or false heads. They were oblong to egg-shaped, hyaline, non-septate, and measured 5.6-8.4 x 2.8-3.6 μ (Av. 10 = 7.42 x 3.22 μ).

Gibberella zeae.--Mature perithecia of G. zeae were found on a small proportion of grains in moldy heads at all three locations. They were aggregated to form a crust of blue-black granules on the surface of the grain. The ascospores were hyaline, spindle-shaped, slightly curved, and 1-3-septate (typically 3-septate). Three-septate ascospores measured 19.6-26.6 x 4.8-5.6 μ (Av. 25 = 22.76 x 5.15 μ).

Colletotrichum graminicolum.--This fungus was not uncommon on grains in heads not attacked by molds. It did not produce a visible mycelium but formed distinct lines of black acervuli running from the base to the apex of the grain and giving it a striped appearance. The conidia were fusoid, falcate, pointed and hooked at the tips, hyaline, non-septate, and measured 22.4-33.6 x 4.8-5.6 μ (Av. 25 = 28.34 x 5.12 μ). This fungus was not isolated from surface-sterilized grains even when acervuli were present on the surface of the grain. However, it may have been obscured by the more rapidly growing Fusaria that were present in almost all seeds.

Stalk Rots

Stalk rots were the most serious diseases in the test at Rome although they were absent at Sandersville and Experiment. Infection was high in some varieties and resulted in considerable lodging as is indicated in Table 1. Imperial kafir, Imperial kafir No. 360, and hegari seemed highly resistant to stalk rot. Double Dwarf milo no. 38 was the most resistant of the combine types.

A complex of stalk rots was present in the test at Rome. Different types were tentatively determined upon the basis of symptoms as anthracnose stalk rot, charcoal rot, rhizoctonia stalk rot, and southern sclerotial rot. Little support for these determinations was derived from isolations since the majority of isolates proved to be Fusarium spp. Some of these, such as F. moniliforme, might have been the primary cause of rot, but it was impossible to connect them with any definite symptoms. Fusarium spp. were obtained from the majority of tissue plantings from stalks showing definite symptoms of charcoal rot; and it seems that in this case at least the Fusarium spp. were secondary organisms. No attempt was made to classify the type of rot in each variety. A superficial examination of four varieties indicated, however, that differences probably could be demonstrated among the varieties. Caprock, for example, appeared to be attacked only by rhizoctonia stalk rot. Only anthracnose stalk rot was found on Double Dwarf Yellow Sooner. Although some stalks were diseased with anthracnose stalk rot, the chief rot on Plainsman and Martin's combine milo was charcoal rot.

Anthracnose Stalk Rot (Colletotrichum graminicolum).--The pith of stalks infected with C. graminicolum showed bright-red to purple spots and streaks. The surface of the stalk over the discolored areas was spotted and streaked. It often appeared as if the stalk had been infected through the rind at many points along the upper internodes, the basal internodes showing no evidence of infection. Ultimately, the whole interior of the stalk became red or purple. The lower internodes were completely rotted. The fibers were matted against the rind in a dark-red

mass, leaving the stem hollow.

Of 21 isolates from 8 stalks showing these symptoms 11 were Colletotrichum graminicolum, 4 were Fusarium sp. (2 F. moniliforme), 1 was a basidiomycete with hyaline, clamp-bearing hyphae, and 5 were unidentified. The isolates of C. graminicolum differed slightly from those obtained from sorghum leaves in that they produced conidia in salmon-colored masses along the upper margin of the slope. These conidia, however, were identical with those in isolates from other parts of the plant. They measured 19.6-28.0 x 4.76-6.44 μ (Av. 25 = 24.19 x 5.29 μ).

Charcoal Rot (Sclerotium bataticola Taub.).--The split stalks of infected plants exhibited a tan discoloration of the tissues at the nodes. The stalk was retted above the nodes, and the fibers were peppered with tiny black sclerotia. Sclerotia were present in the pith throughout the internodes, giving it a pale gray appearance. Sclerotia were found up to the eighth internode or up to the base of the peduncle. The basal nodes and internodes became completely retted. The fibers remained in place and were dry and covered with sclerotia. The base of the stem crushed easily between the fingers.

Of 21 isolates from 7 stalks with these symptoms 1 was Sclerotium bataticola, 16 were Fusarium spp. (1 Gibberella zeae, 9 F. moniliforme), 2 were Basidiomycetes, and 2 were unidentified. The isolates of S. bataticola formed a sparse hyaline mycelium over the surface of the agar and soon covered it with a crust of black sclerotia. The sclerotia were 55.2-165.6 μ in diameter (Av. 25 = 102.53 μ).

Rhizoctonia Stalk Rot (Rhizoctonia solani Kuehn).--The symptoms of rhizoctonia stalk rot were similar to those of charcoal rot except for the absence of sclerotia. Infected stalks showed a tan to pale-brown discoloration of the nodes. The tissues were retted for a distance of about 1 cm. above each node. The stalk was shrunken and weakened and usually broke over at a point just above a node rather than at the base as in stalks infected with charcoal rot.

Seventeen isolates were obtained from 5 stalks that exhibited symptoms of rhizoctonia stalk rot. Three of these isolates were Rhizoctonia solani, 11 were Fusarium spp. (3 F. moniliforme), and 3 were unidentified. The isolates of R. solani formed a compact, closely appressed, pale-tan surface layer, with almost no aerial mycelium. A few small, tan, amorphous sclerotia were produced at the margin of the slope.

Southern Sclerotial Rot (Sclerotium rolfsii Sacc.).--Traces of this rot were found in the test at Rome. However, it was much more abundant in a planting of Caprock near Rome. Here a number of plants in a limited area of the field were infected although only a trace of damage was recorded for the entire planting. On infected plants there was a heavy mat of white mycelium growing up inside the leaf sheaths to a point 1 to 1 1/2 feet above the ground level. Mycelial fans emerged from the leaf sheaths and spread out over the base of the blade for a distance of 1-2 cm. Young axillary shoots were covered with mycelium and blighted, and the infected leaves were dying. The sheaths were discolored and reddish. The tissue at the inner surface of the sheaths was shredded. Spherical, white sclerotia that became tan and finally brown and 1-2 mm. in diameter formed in large numbers inside the leaf sheath and over the ligule. A few plants were entirely dead. The brown, shredded sheaths at the base of the plants were filled with sclerotia which rolled out like shot when the leaves were stripped.

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GEORGIA EXPERIMENT STATION, EXPERIMENT, GEORGIA

DISEASE SURVEY OF DOMESTIC BULBS 1948-49

F. P. Hubert and W. H. Wheeler

During the fall of 1948 and the spring of 1949 the Bureau of Entomology and Plant Quarantine made a survey to determine the distribution and degree of disease infection found on domestic-grown flower bulbs in interstate shipments. This survey was conducted jointly by the Divisions of Domestic and Foreign Plant Quarantines through the work of approximately 25 inspectors stationed at 21 points in 14 States and the District of Columbia. The disease survey was limited to 5 kinds of domestic bulbs and corms--lily, tulip, narcissus, gladiolus, and iris. Inspections were made only of commercial shipments, which usually included a number of cases of bulbs. No noncommercial shipments were opened. All examinations were made by Bureau inspectors or collaborating State workers, in connection with other assignments. Determinations of diseases found on bulbs and corms were made by D. P. Limber and other workers of the Division of Foreign Plant Quarantines of this Bureau, and by specialists of the Division of Mycology and Plant Disease Survey and of the Division of Nematology, of the Bureau of Plant Industry, Soils, and Agricultural Engineering.

The results of this domestic bulb survey tended to show the general absence, or only the presence of relatively small amounts, of important pathogens, such as the stem and bulb nematode (Ditylenchus dipsaci (Kuehn) Filipjev) in narcissus and Ditylenchus sp. in bulbous iris shipped interstate. The collection of Curvularia lunata (Wakker) Boed. on gladiolus corms produced in Virginia represented the first record of the occurrence of the fungus on that host from that State. The species of Colletotrichum intercepted on lily bulbs from the States of Oregon and Washington was believed to be C. lilii Plakidas, which was apparently unrecorded from those lily-growing States prior to this survey.

In the bulb disease survey 305 cases of domestic tulip bulbs from 4 States were found in interstate commerce, and 22 cases in these shipments were examined for disease symptoms. Such common organisms as Botrytis tulipae (Lib.) Lind, Fusarium sp., Verticillium lateritium Berk. (Acrostalagmus cinnabarinus Cda.), and Rhizopus sp. were found in comparatively small amounts.

Bureau inspectors observed 337 cases of bulbous iris in shipments originating in 6 States. In 80 cases of bulbs Ditylenchus sp. was found in slight amounts in a few instances. The fungi Fusarium sp., Verticillium sp., and Penicillium sp. were also found in small amounts.

A total of 1,843 cases of lily bulbs from 6 States were observed and bulbs examined in 65 cases. In addition to the findings of Colletotrichum sp. mentioned above, fungi identified from infected specimens included Botrytis elliptica (Berk.) Cke., Tritirachium dependens Limber, Fusarium sp., Verticillium sp., and Penicillium sp. Inspectors found 1,644 cases of narcissus bulbs from 6 States and examined 168 cases for disease symptoms. Organisms determined from diseased specimens included Fusarium oxysporum Schlecht f. narcissi Snyder & Hansen, Ophiostoma sp. (undescribed), Sclerotium delphinii Welch (1 of 2 geographical varieties of Pellicularia rolfsii E. West), Ditylenchus dipsaci (Kuehn) Filipjev, and Aphelenchoides parietinus (Bastian) Steiner.

A total of 3,281 cases of gladiolus corms from 14 States and the District of Columbia were observed and 451 cases inspected for the presence of disease. In addition to Curvularia lunata, other fungi found included Fusarium oxysporum Schlecht f. gladioli (Massey) Snyder & Hansen, Botrytis gladiolorum Timmermans, Sclerotinia gladioli (Massey) Drayton, Penicillium gladioli McCulloch & Thom, Alternaria sp., Saccharomycetaceae spp., Septoria gladioli Pass., Rhizoctonia solani Kuehn, Ophiostoma sp., Papulaspora sp. and Tritirachium dependens Limber, and the bacterium Pseudomonas marginata (McCull.) Stapp. They were found in general to be widely spread, and infection ranged from a trace to an estimated high of 80 percent in one shipment, although most shipments had an infection of 2 percent or less.

A summary of the domestic bulb inspections, listing the organisms identified in diseased bulbs and corms by States of origin and the times intercepted, is presented below.

Summary of Domestic Bulb Inspections 1948-49

GLADIOLUS - 3281 cases involved, 451 cases examined.

Organisms Identified:	States of Origin and Times Intercepted:
Alternaria sp.	Mich.
Botrytis gladiolorum Timmermans	Fla., Md., Mass., Mich. (9), N. J., N. Y.

GLADIOLUS - (Cont'd.)

Curvularia lunata (Wakker) Boed.	Fla. (2), Va. (3).
Fusarium oxysporum Schlecht f. gladioli (Massey) Snyder & Hansen	Calif., D. C., Fla. (4), Md. (2), Mich. (5), N. J., N. Y., N. C. (3), Tex. (6), Va. (2).
Fusarium sp.	Calif., D. C., Fla., Ill. (2), N. Y., Oreg. (2), Tex.
Ophiostoma sp.	Oreg.
Papulaspora sp.	Wis.
Penicillium gladioli McCull. & Thom	Fla., Ill. (4), Md., Mass., Mich. (11), N. J., N. Y. (3), Oreg. (7), Wis.
Pseudomonas marginata (McCull.) Stapp	Calif., D. C., Fla. (3), Ill. (6), Md., Mass., Mich. (8), N. J., N. Y. (3), N. C., Oreg. (9), Tex. (3), Va. (3), Wis.
Rhizoctonia solani Kuehn	Oreg. (2).
Saccharomycetaceae spp.	Ill.
Sclerotinia gladioli (Massey) Drayton	Calif., Fla., Ill., Mich., N. Y. (3), N. C., Oreg. (3), Va., Wis.
Septoria gladioli Pass.	N. J., Oreg., Wis.
Tritirachium dependens Limber	Tex.

IRIS - 337 cases involved, 80 cases inspected.

Ditylenchus sp.	Wash. (3).
Fusarium sp.	Calif., N. Y., Oreg. (3), Wash.
Penicillium sp.	Oreg. (7), Wash. (4).
Verticillium sp.	Oreg.

LILY - 1843 cases involved, 65 cases inspected.

Botrytis elliptica (Berk.) Cke.	Oreg. (2).
Colletotrichum sp.	La.
Colletotrichum sp. (prob. C. lilii Plakidas)	Oreg. (5), Wash.
Fusarium sp.	N. Y., Oreg., Wash.
Penicillium sp.	La., Mich., Ohio, Oreg. (2).
Tritirachium dependens Limber	La.
Verticillium sp.	N. Y., Ohio

NARCISSUS - 1644 cases involved, 168 cases examined.

Aphelenchoides parietinus (Bastian) Steiner	Oreg.
Aspergillus niger v. Tiegh.	Va.
Aspergillus sp.	Fla.
Ditylenchus dipsaci (Kuehn) Filipjev	Oreg.
Ditylenchus sp.	Oreg., Wash.
Fusarium oxysporum Schlecht f. narcissi Snyder & Hansen	Fla., Oreg. (8), Va., Wash.
Fusarium sp.	Fla. (2), N. Y., Oreg. (5).
Ophiostoma sp. (undescribed)	Fla., N. Y., Oreg. (5), Wash.
Penicillium sp.	Va.
Sclerotium delphinii Welch (1 of 2 geographical varieties of Pellicularia rolfsii E. West)	Oreg., Wash.
Sclerotium sp.	Va.
Verticillium sp.	Oreg.

TULIP - 305 cases involved, 22 cases inspected.

Botrytis tulipae (Lib.) Lind	N. J. (2).
Fusarium sp.	Oreg., Wash.

TULIP - (Cont'd)

Penicillium sp.	Wash. (2).
Rhizopus necans Massee	Wash.
Rhizopus sp.	Wash. (2).
Verticillium lateritium Berk. (Acrostalagmus cinnabarinus Cda.)	Wash.

DIVISION OF DOMESTIC PLANT QUARANTINES, DIVISION OF FOREIGN PLANT QUARANTINES BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE, AGRICULTURAL RESEARCH ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON 25, D. C.

TARGET LEAF SPOT OF HEVEA RUBBER IN COSTA RICA

J. B. Carpenter and M. H. Langford

The target leaf spot of Hevea brasiliensis (H. B. K.) Muell. Arg. and other species, caused by Pellicularia filamentosa (Pat.) Rogers, has been reported from Brazil (2) and Perú (3, 4) as a serious disease, especially in nurseries and young plantings. On two occasions, the disease has appeared in the nurseries of the United States Department of Agriculture Cooperative Rubber Plant Field Station at Turrialba, Costa Rica. The first outbreak occurred in December 1947, on clone FX-1041. Diseased leaves were forwarded for identification to the rubber pathologist at the Estación Experimental Agrícola de Tingo María, Tingo María, Perú. Mycological examination of the specimens confirmed the tentative identification made in Costa Rica. From the same specimens, pure cultures were obtained and small bits of infected leaf tissue were used to inoculate young rubber leaves, which proved highly susceptible and displayed typical symptoms. Meanwhile, in order to eliminate a source of infection in Costa Rica, the infected leaves were destroyed and the disease disappeared. It reappeared again in July 1949, on clone FX-642, and again steps were taken to eradicate all diseased material. In both cases only a single clone was affected.

The infections on rubber are believed to have passed to it from some of the numerous hosts of this fungus. Crandall (1) has reported certain successful cross inoculations with isolates of the fungus derived from Hevea, bean (Phaseolus vulgaris L.), roselle (Hibiscus sabdariffa L.), and kenaf (H. cannabinus L.).

Additional small-scale inoculation experiments at Tingo María have shown that the Pellicularia filamentosa from Dolichos hosei Craib, rice bean (Phaseolus calcaratus Roxbg.), and molasses grass (Melinis minutiflora Beauv.) are pathogenic on rubber when that host is inoculated with either infected leaf tissue or pure cultures on agar blocks.

Since the climatic conditions at Turrialba are similar to those at Tingo María, this disease is a potential threat in Costa Rica and every suspected occurrence of the disease should be reported promptly.

Literature Cited

1. Crandall, B. S. Pellicularia target spot leaf disease of kenaf and roselle. Phytopath. 38: 503-505. 1948.
2. Deslandes, J. A. Observacões fitopatológicos na Amazonia. Bol. Fitosan. Ministerio Agricultura, Rio de Janeiro 1: 197-242. 1944. (Abstract, Review of Applied Mycology 26: 333-335)
3. Kotila, J. E. Rhizoctonia foliage disease of Hevea brasiliensis. Phytopath. 35: 739-741. 1945.
4. Lorenz, R. C. A new leaf disease of Hevea in Perú. Jour. For. 46: 27-30. 1948.

DIVISION OF RUBBER PLANT INVESTIGATIONS, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

NEW OR UNUSUAL RECORDS OF PLANT DISEASE OCCURRENCE

RASPLEAF AND OTHER VIRUS DISEASES ON SOUR CHERRY IN COLORADO

By Austin O. Simonds

Raspleaf, a virus disease commonly considered to be present only on sweet cherries, was found (seven or eight cases) on Montmorency in Colorado this last season.

Ring spot and sour cherry yellows virus diseases are also present and widespread in Colorado.

COLORADO A & M COLLEGE, FORT COLLINS

AN EXTENSION OF RANGE OF USTILAGINOIDEA ARUNDINELLAE

By William W. Diehl

U. arundinellae P. Henn., hitherto known only from limited areas in Japan and China as the cause of floret abortion of but one host species, Arundinella anomala Steud., is here reported from Korea and India, in the latter instance on a different species of Arundinella:

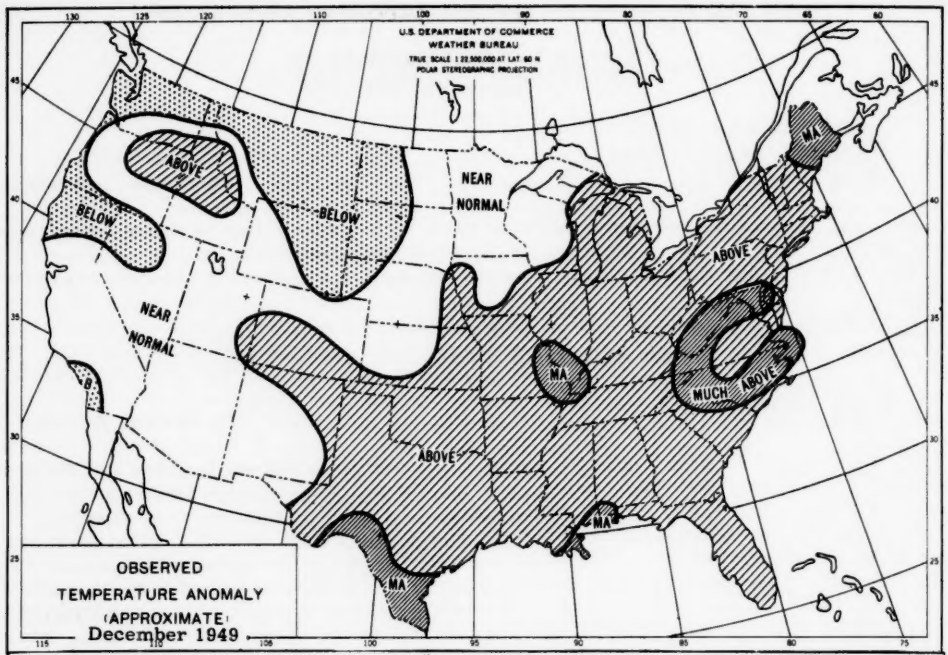
The species was described by Hennings (Engler's Bot. Jahrb. 37: 157. 1905) from one place in Japan, since cited in an anonymous Japanese review in the Botanical Magazine of Tokyo (25: 488. 1911) and also by Shirai and Hara (A list of Japanese fungi hitherto known 3d. ed. p. 418, 1927). It was later recorded from two points in China (Checkiang and Kangsu) by Teng (Sinensia 7: 263. 1936; Contrib. to our knowledge of the higher fungi of China p. 33, 1939).

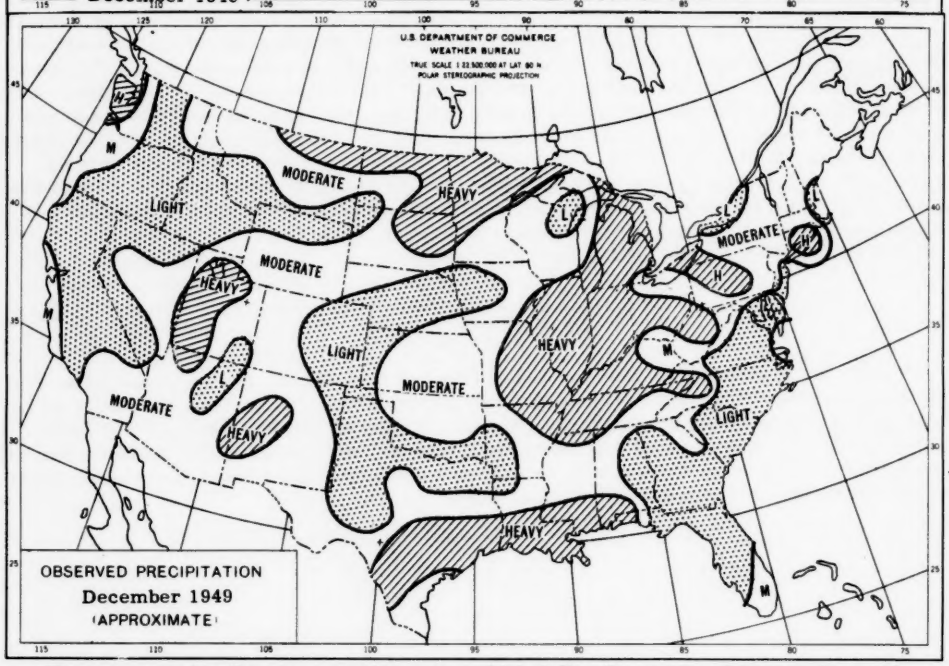
No Japanese specimens are available for comparison but the materials cited by Teng (S. Q. Deng nos. 672 and 674) in the Chinese Herbarium of the Mycological Collections at the Plant Industry Station agree completely with the Korean specimen labeled as from "Ritsuri" found in 1930 by P. H. Dorsett and W. J. Morse (no. 6342). The specimen from India of a somewhat different appearance but recognizable as of the same species has been made available by C. L. Lefebvre; it was found at Katla (alt. 6000 ft.), Kangra District, Eastern Punjab in 1948 by Walter Koelz (no. 19629). The host, A. nepalensis Trin. has a more delicate inflorescence with smaller florets and spikelets than A. anomala accounting for the relatively smaller spore balls of the Indian specimen; in both hosts however the spores are alike 4-6 μ in diameter and bear the characteristic echinulations.

DIVISION OF MYCOLOGY AND DISEASE SURVEY

ATTENTION PLEASE!

We urge those pathologists who have been asked by Dr. George McNew, chairman, Special Committee on Spray Tolerances of the American Phytopathological Society, for fungicide information to be used during the tolerance hearings being conducted by the Food and Drug Administration, and have not yet submitted their reports, to do so at once. As these hearings get under way, it becomes obvious that the ultimate decisions may have far reaching effects upon each of us engaged in plant pathological work.





The terms used in the accompanying maps, which define the ranges of temperature and precipitation, are numerical class limits. These are based on a statistical analysis of past records through which is determined the normal frequency of occurrence of temperatures and precipitation at various times of the year for different locations. For temperature the classes above, below, and near normal are so defined that they each normally occur one-fourth of the time; much above and much below normal, one-eighth of the time. Precipitation is depicted in terms of light, moderate, and heavy, each class normally occurring one-third of the time and thereby having equal probability of occurrence. These maps graphically represent only the general trends and give the country's weather picture at a glance. For quantitative studies, where monthly mean temperatures and actual precipitation records are needed for a given time and place, other publications of the Weather Bureau should be consulted.